

Amendments to the Specification:

Please add the following new paragraph at page 1, after the title of the application:

This application is the U.S. National Phase application of PCT International Application No. PCT/GB2004/003470, filed August 9, 2004, and claims priority of British Patent Application No. 0318776.2.

Please add the following heading at page 1, before line 5:

FIELD OF THE INVENTION

Please add the following heading at page 1, line 11:

BACKGROUND OF THE INVENTION

Please replace the paragraph beginning at page 2, line 11, with the following rewritten paragraph:

We have investigated the known silver- and zeolite-based LNC's and we have found that their low temperature activity is improved when the reductant is treated with a partial oxidation catalyst. We believe that this step produces an oxygenated hydrocarbon feedstock. Furthermore, we believe that the activity of Ag/Al₂O₃ is suppressed by coke formation, which may be one reason why it has not found wider acceptance in the industry. ~~We have now discovered that selective, low temperature NO_x reduction can be improved by combining known silver and/or zeolite based LNC's with at least one partial oxidation catalyst (POC).~~

Please add the following heading and paragraph at page 3, line 9:

SUMMARY OF THE INVENTION

We have now discovered that selective, low temperature NO_x reduction can be improved by combining known silver- and/or zeolite-based LNC's with at least one partial oxidation catalyst (POC).

Please add the following paragraphs and heading at page 3, line 26:

According to a second aspect, the invention provides an exhaust system for a lean-burn internal combustion engine comprising a catalyst structure according to the invention.

According to a third aspect according to the invention, an apparatus comprises a lean-burn internal combustion engine including an exhaust system according to the invention.

According to a fourth aspect, the invention provides a method of selectively reducing NO_x in an exhaust gas of a lean burn internal combustion engine to N_2 , which method comprises introducing a reductant into the exhaust gas and contacting the resulting mixture with a lean NO_x catalyst (LNC) composition associated with at least one partial oxidation catalyst (POC), wherein the LNC composition is selected from the group consisting of: (a) silver or a silver compound supported on alumina; and (b) at least one metal selected from the group consisting of copper (Cu), iron (Fe), cobalt (Co) and cerium (Ce) supported on at least one zeolite, and wherein the at least one POC is selected from the group consisting of: (i) a bulk oxide, a bulk composite oxide or a bulk mixed oxide comprising at least one metal selected from the group consisting of manganese (Mn), iron (Fe), cerium (Ce) and praseodymium (Pr); and (ii) at least one of rhodium (Rh) and palladium (Pd) disposed on at least one inorganic oxide support.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be more fully understood, the following Examples are provided by way of illustration only and with reference to the accompanying drawings, in which:

Figure 1 is a graph comparing % NO_x conversion between steady state and transient modes for Comparative Example 1 as a function of temperature;

Figure 2 is a graph showing % NO_x conversion over the Catalyst of Example 1 compared with the Catalyst of Comparative Example 2 in the steady state mode as a function of temperature;

Figure 3 is a graph showing the outlet NO_x concentration as a function of time at 200°C, 250°C and 300°C over 2%Ag/ Al_2O_3 and the 2Ag/ Al_2O_3 -CeO₂ mixture in the steady mode;

Figure 4 is a graph showing the effect of ramp down (steady state 15 minutes) and ramp up (steady state 15 minutes) on NO_x conversion of 2Ag/ Al_2O_3 -CeO₂ (4:1);

Figure 5 is a graph shown the effect of ramp down (steady state 15 minutes) and ramp up (steady state 15 minutes) on HC conversion of $2\text{Ag}/\text{Al}_2\text{O}_3\text{-CeO}_2$ (4:1);

Figure 6 is a graph comparing the effect of ageing on Comparative Example 1 and Example 1 catalysts on NO_x conversion;

Figure 7 is a graph showing $\% \text{NO}_x$ conversion as a function of temperature for $5\text{Cu}/\text{ZSM5}$ catalyst structures compared with $5\text{Cu}/\text{ZSM5}$ catalyst *per se*;

Figure 8 is a graph shown $\% \text{NO}_x$ conversion as a function of temperature for $2\text{Ag}/\text{Al}_2\text{O}_3$ catalyst structures compared with $2\text{Ag}/\text{Al}_2\text{O}_3$ catalyst *per se*;

Figure 9 is a graph shown $\% \text{NO}_x$ conversion as a function of temperature for a catalyst according to JP 2002370031 compared with $2\text{Ag}/\text{Al}_2\text{O}_3$ and $5\text{Cu}/\text{ZSM5}$ catalyst structures according to the invention; and

Figure 10A-F includes a series of schematic arrangements of catalyst structures according to the present invention.

Please delete the paragraph at page 6, lines 6-8.

Please delete the paragraph at page 6, lines 22-24.

Please delete the paragraph at page 8, lines 14-25.

Please delete the paragraphs at page 9, line 1, through page 10, line 2.

Please add the following heading at page 11, line 11:

EXAMPLES

Please replace the paragraph beginning at page 12, line 33, with the following rewritten paragraph:

A ceramic flow-through monolith substrate core 2.54cm (1 inch) in diameter and 7.62 cm (3 inches) in length was coated with alumina powder at a loading of 2.5 g per cubic inch (152.6g per litre) and the coated core was dried. The washcoated alumina was then impregnated with a mixture of silver and cerium salts to achieve a final catalyst loading of 2wt% silver and 10wt% cerium, and the resulting piece was dried and calcined. As far as the abstract of this patent publication can be understood, the above arrangement falls within its teaching.

Please replace the paragraph beginning at page 16, line 14, with the following rewritten paragraph:

The results of steady state analysis tests performed on the catalyst cores of Example 2 are shown in Figure 7. Two configurations of the third core were tested: the CeO_2 zone of the upstream end; and the CeO_2 zone of the downstream end. It can be seen, as illustrated in Figure 8, that low temperature NO_x conversion in the $2\text{Ag}/\text{Al}_2\text{O}_3$ core is improved for the catalyst structures containing CeO_2 relative to $2\text{Ag}/\text{Al}_2\text{O}_3$ *per se*. We believe that this results from a combination of partial oxidation products in the feedstock contacting the LNC and reduced coking of the LNC. Higher temperature NO_x conversion is suppressed in the configurations wherein the CeO_2 is present in the upstream zone of the core relative to $2\text{Ag}/\text{Al}_2\text{O}_3$ *per se*, because the CeO_2 favours complete combustion of the hydrocarbon instead of partial oxidation at higher temperatures. However, this can be retained with improved low temperature NO_x conversion relative to $2\text{Ag}/\text{Al}_2\text{O}_3$ *per se* when the mixed $2\text{Ag}/\text{Al}_2\text{O}_3$ - CeO_2 zone is on the downstream end of the core with $2\text{Ag}/\text{Al}_2\text{O}_3$ *per se* on the upstream end zone.